

(b) Because it is not necessary to extend a cable of the communication line or the power/communication line when an SPD is annexed, the SPD can be easily annexed.

(c) As a result of work for installing an SPD being simplified, workability is improved.

(d) Because trouble for laying work in the communication line or the power/communication line is reduced, for example, an SPD having a function of replacement recommendation display or a function of contact output to a distance can be attached to a location where there are several tens to several hundred lines in a communication system, or the like.

[0017] The above-described and other objects and new features of the present invention will become more apparent from the following description of the preferred embodiments in conjunction with the accompanying drawings, which are provided for illustration, not for limiting the scope of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] FIG. 1 is a perspective view illustrating a surge protective system driven by an external power supply according to a first embodiment of the present invention;

[0019] FIG. 2 is a perspective view illustrating the system in FIG. 1 in a separated manner;

[0020] FIG. 3 is a schematic plan view of the system in FIG. 1;

[0021] FIG. 4 is a schematic diagram illustrating a juncture image between an SPD side jack 10 and a power supply unit side jack 60 in FIG. 2;

[0022] FIG. 5 is a left side view of an SPD 1 in FIG. 1;

[0023] FIG. 6 is a right side view of the SPD 1 in FIG. 1;

[0024] FIG. 7 is a plan view of the SPD 1 in FIG. 1;

[0025] FIG. 8 is a bottom view of the SPD 1 in FIG. 1;

[0026] FIG. 9 is a perspective view illustrating a state where a juncture plug 25 is loaded to the SPD side jack 10 in FIG. 2;

[0027] FIG. 10A is a plan view of the SPD side jack 10 in FIG. 2;

[0028] FIG. 10B is a plan view illustrating a juncture state between the SPD side jack 10 and the power supply unit side jack 60 in FIG. 2;

[0029] FIG. 10C is a plan view illustrating a state where the juncture plug 25 is loaded to the jacks 10 and 60 in FIG. 10B;

[0030] FIG. 11 is a perspective view of a bottom face side in FIG. 9;

[0031] FIG. 12 is a schematic exploded perspective view illustrating the SPD side jack 10 in FIG. 9;

[0032] FIG. 13 is a left side view of an SPD side plug 30 in FIG. 2;

[0033] FIG. 14 is a bottom view of the SPD side plug 30 in FIG. 2;

[0034] FIG. 15 is a partially cutout perspective view of the SPD side plug 30 in FIG. 2;

[0035] FIG. 16 is a perspective view of an internal structure in which internal parts of the SPD side plug 30 in FIG. 2 are omitted;

[0036] FIG. 17 is a schematic circuit diagram illustrating a configuration of the surge protective system according to the first embodiment of the present invention; and

[0037] FIG. 18 is a schematic circuit diagram illustrating a surge protective system driven by a battery according to a second embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

First Embodiment

(Configuration of First Embodiment)

[0038] FIG. 1 is a perspective view illustrating appearance of a surge protective system driven by an external power supply according to a first embodiment of the present invention. FIG. 2 is a perspective view illustrating the system in FIG. 1 in a separated manner. FIG. 3 is a schematic plan view of the system in FIG. 1. Further, FIG. 4 is a schematic diagram illustrating a juncture image between an SPD side jack 10 and a power supply unit side jack 60 in FIG. 2.

[0039] The surge protective system driven by the external power supply according to the first embodiment includes a plurality of SPDs 1 (for example, three SPDs 1-1, 1-2 and 1-3) for communication and one power supply unit 50, and these three SPDs 1 and one power supply unit 50 are fixed and installed together using a mounting rail for devices (for example, a DIN rail) 80. The DIN rail 80 is a device mounting fitting with, for example, a width of 35 mm defined in DIN standards. The DIN standards defines a mounting rail for devices for mounting electric equipment such as a switch and an industrial terminal block used with AC 1000 V or lower or DC 1500 V or lower. It should be noted that the number of SPDs 1 to be mounted is arbitrary according to the number of lines. Further, the three SPDs 1 and one power supply unit 50 may be directly fixed at a wooden board without using the DIN rail 80.

[0040] Each of the SPDs 1 (for example, three SPDs 1-1, 1-2 and 1-3) is connected between each of external line side lines 2 (for example, three external line side lines 2-1, 2-2 and 2-3) as an external line configured with a communication line or a control line and each of equipment side lines 3 (for example, three equipment side lines 3-1, 3-2 and 3-3) connected to equipment to be protected such as communication equipment and control equipment. Each SPD 1 has a protection function of protecting equipment to be protected against an abnormal voltage/abnormal current of lightning surge intruding from the external line side line 2 or the equipment side line 3, a display function of monitoring degradation as a result of the SPD 1 being repeatedly exposed to the lightning surge and displaying a degradation state of the SPD 1, and an output function of performing external output when replacement of the SPD is recommended. The power supply unit 50 is connected between an external power supply 5 and a contact output signal line 6, and has a function of supplying a power supply voltage (for example, DC 24 V) input from the external power supply 5 to each SPD 1 and transmitting information such as the degradation state of each SPD 1 and SPD replacement recommendation to the contact output signal line 6.

[0041] Each SPD 1 includes an SPD side jack 10 connected to the external line side line 2 and the equipment side line 3, and an SPD side plug 30 detachably attached by insertion to the jack 10.

[0042] The SPD side jack 10 which has a wiring function and an output function, includes a substantially U-shaped case 11. The substantially U-shaped case 11 has two facing erected parts of a first erected part and a second erected part which have a substantially rectangular cylindrical shape, and a coupling part which couples lower parts of these first